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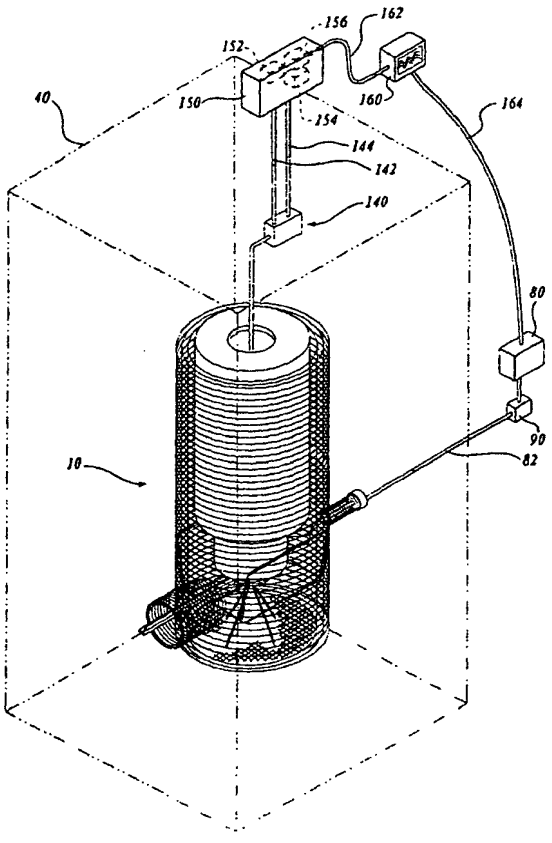
(54) Title: CHARACTERIZING A SAMPLE BY LOW-FREQUENCY SPECTRA



(57) Abstract: A method and apparatus for interrogating a sample that exhibits molecular rotation are disclosed. In practicing the method, the sample is placed in a container having both magnetic and electromagnetic shielding, and Gaussian noise is injected into the sample. An electromagnetic time-domain signal composed of sample source radiation superimposed on the injected Guassian noise is detected, and this signal is used to generate a spectral plot that displays, at a selected power setting of the Gaussian noise source, low-frequency spectral components characteristic of the sample in a selected frequency range between DC and 50 kHz. In one embodiment, the spectral plot that is generated is a histogram of stochastic resonance events over the selected frequency range. From this spectrum, one or more low-frequency signal components that are characteristic of the sample being interrogated are identified.

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